

ETSI TS 183 033 V1.2.0 (2007-10)

Technical Specification

**Telecommunications and Internet converged Services and
Protocols for Advanced Networking (TISPAN);
IP Multimedia;
Diameter based protocol for the interfaces between the
Call Session Control Function and the User Profile Server
Function/Subscription Locator Function;
Signalling flows and protocol details**

[3GPP TS 29.228 V6.8.0 and 3GPP TS 29.229 V6.6.0, modified]



Reference

RTS/TISPAN-03128-NGN-R1

Keywords

architecture, endorsement, interface, signalling

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Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN).

1 Scope

The present document provides the ETSI TISPAN endorsement of the 3GPP TS 29.228 [1] "Cx and Dx interfaces; Signalling flows and messages contents (Release 6)" and the 3GPP TS 29.229 [2] "IP Multimedia (IM) Subsystem Cx and Dx interfaces based on the DIAMETER protocol; Protocol details (Release 6)".

The present document provides the necessary adaptations to the above specifications, in order to comply with the requirements of NGN Release 1.

Additionally, the present document provides the necessary protocol extensions needed in support of HTTP Digest authentication (see annex A).

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
 - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
 - for informative references.

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NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

- [1] 3GPP TS 29.228 (V6.8.0): "3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; IP Multimedia (IM) Subsystem Cx and Dx interfaces; Signalling flows and message contents (Release 6)".
- [2] 3GPP TS 29.229 (V6.6.0): "3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; Cx and Dx interfaces based on the Diameter protocol; Protocol details (Release 6)".
- [3] Void.
- [4] IETF RFC 2617: "HTTP Authentication: Basic and Digest Access Authentication".
- [5] IETF RFC 3588: "Diameter Base Protocol".

2.2 Informative references

- [6] draft-ietf-aaa-diameter-sip-app-10: "Diameter Session Initiation Protocol (SIP) Application".

3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AVP	Attribute-Value Pair
CSCF	Call Session Control Function
ETSI	European Telecommunications Standards Institute
HTTP	Hyper Text Transfer Protocol
IETF	Internet Engineering Task Force
RFC	Request For Comments
S-CSCF	Serving-CSCF
SIP	Session Initiation Protocol
UPSF	User Profile Server Function

4 Endorsement notice

The elements of 3GPP TS 29.228 [1] and 3GPP TS 29.229 [2] apply, with the following modifications.

NOTE: Underlining and/or strike-out are used to highlight detailed modifications where necessary.

5 Global modifications to 3GPP TS 29.228

Replace the clauses "Scope", "References" and "Definitions, symbols and abbreviations" with the following three clauses (Scope, References and Definitions, symbols and abbreviations).

1 Scope

The scope is endorsed with the replacement of the "HSS" by the "UPSF".

2 References

Replace the references in [1] as shown in table 1.

Table 1: Replacement of references in 3GPP TS 29.228

	Reference in 3GPP TS 29.228	Replaced references
1	3GPP TS 23.228: "IP Multimedia (IM) Subsystem - Stage 2 (Release 5)".	ETSI TS 182 006: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Subsystem (IMS); Stage 2 description [3GPP TS 23.228 v7.2.0, modified]" (note 1).
2	3GPP TS 24.228: "Signalling flows for the IP multimedia call control based on SIP and SDP".	(note 2).
3	3GPP TS 33.203: "Access security for IP-based services".	(note 2).
4	3GPP TS 23.002 "Network architecture".	ETSI ES 282 001: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture Release 1" (note 1).
5	3GPP TS 29.229 [2]: "Cx Interface based on Diameter - Protocol details".	The present document (note 1).
8	3GPP TS 24.229: "IP Multimedia Call Control Protocol based on SIP and SDP" - stage 3.	ETSI ES 283 003: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Call Control Protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP) Stage 3 [3GPP TS 24.229 (Release 7), modified]" (note 1).
10	3GPP TS 23.141: "Presence Service; Architecture and Functional Description".	ETSI TS 182 008: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Presence Service; Architecture and functional description [Endorsement of 3GPP TS 23.141 and OMA-AD-Presence_SIMPLE-V1_0]" (note 1).
NOTE 1: The reference in [1] is replaced by the document listed on the right column. This replacement is applicable to all occurrences of the reference throughout the present document.		
NOTE 2: The reference in [1] contains 3GPP specific requirements and is not generally applicable to the present document.		

3 Definitions, symbols and abbreviations

Endorsed with changes.

3.1 Definitions

Endorsed with the replacement of the "HSS" by the "UPSF".

3.2 Abbreviations

Replace:

HSS Home Subscriber Server

By:

UPSF User Profile Server Function

Add the following abbreviation:

NASS Network Attachment SubSystem

NOTE: Throughout the present document, all occurrences of "HSS" are replaced by "UPSF".

Throughout the text of 3GPP TS 29.228 [1]

4.0 Main concept

Endorsed.

5 General Architecture

Endorsed.

6 Procedure Descriptions

Endorsed with changes.

6.3 Authentication procedures

Endorsed with changes.

Modify as follows:

This procedure is used between the S-CSCF and the HSS to exchange information to support the authentication between the end user and the home IMS network. The procedure is invoked by the S-CSCF, corresponds to the combination of the operations Cx-AV-Req and Cx-AV-Req-Resp (see 3GPP TS 33.203 [3]) and is used:

- To retrieve authentication vectors from the HSS for IMS-AKA authentication.
- To resolve synchronization failures between the sequence numbers in the UE and the HSS for IMS-AKA authentication.
- To promote the result of the NASS-level authentication to the IMS level.

Table 6.3.1 is endorsed with the following addition:

When the S-CSCF performs the operation Cx-AV-Req, if it may not know the authentication scheme at this point (e.g. in the non IMS-AKA cases), it can set SIP-Number-Auth-Items to any positive value.

Table 6.3.2 is endorsed with the following change:

When the S-CSCF performs the operation Cx-AV-Req, if it may not know the authentication scheme at this point (e.g. in the non IMS-AKA case), it should set the SIP-Authentication-scheme field to "unknown". Later the HSS changes this value based on the actual authentication scheme stored in the user authentication data.

Table 6.3.3 is endorsed with the following clarification:

Table 6.3.3 is applicable to IMS-AKA only.

Table 6.3.4 is modified as follows:

Table 6.3.4: Authentication Request Response

Information element name	Mapping to Diameter AVP	Cat.	Description
User Identity (See 7.2)	Public-Identity	C	Public User Identity. It shall be present when the result is DIAMETER_SUCCESS.
Private User Identity (See 7.3)	User-Name	C	Private User Identity. It shall be present when the result is DIAMETER_SUCCESS.
Number Authentication Items (See 7.10)	SIP-Number-Auth-Items	C	This AVP indicates the number of authentication vectors delivered in the Authentication Data information element. It shall be present when the result is DIAMETER_SUCCESS.
Authentication Data (See 7.9)	SIP-Auth-Data-Item	C	If the SIP-Number-Auth-Items AVP is equal to zero or it is not present, then this AVP shall not be present. See table 6.3.5 and table 6.3.A for the contents of this information element.
Result (See 7.6)	Result-Code / Experimental-Result	M	Result of the operation. Result-Code AVP shall be used for errors defined in the Diameter Base Protocol. Experimental-Result AVP shall be used for Cx/Dx errors. This is a grouped AVP which contains the 3GPP Vendor ID in the Vendor-Id AVP, and the error code in the Experimental-Result-Code AVP.

Table 6.3.5 is endorsed with the following clarification:

Table 6.3.5 is applicable to IMS-AKA only.

Add the following table:

Table 6.3.A: Authentication Data content - Response for NASS-Bundled Authentication

Information element name	Mapping to Diameter AVP	Cat.	Description
Authentication Scheme (See 7.9.2)	SIP-Authentication-Scheme	M	Authentication scheme. It shall contain "NASS-Bundled".
Line Identifier (See 7.9.8)	Line-Identifier	M	This information element contains a fixed broadband access line identifier associated to the user. This information element can be repeated.

6.3.1 Detailed behaviour

Clause 6.3.1 is endorsed with the following clarifications:

- between step 2 and step 3, the HSS checks the user authentication data for the authentication scheme stored in HSS.
- step 4 is only applicable to authentication schemes that support synchronization.

7 Information Element Contents

Endorsed with changes.

Modify clause 7.9.2 as follows:

7.9.2 Authentication Scheme

This information element contains the authentication scheme, which is used to encode the authentication parameters.

The scheme is "Digest-AKA-v1-MD5".

Add the following clause:

7.9.8 Line Identifier

This information element contains the line identifier of the user's network termination.

8 Error Handling procedures

Endorsed.

9 Protocol version identification

Endorsed.

10 Operational aspects

Endorsed.

Annex A (normative)

Endorsed with changes.

A.3 Cx message parameters to Diameter AVP mapping

Table A.3.1 is endorsed with the following addition:

Table A.3.1: Cx message parameters to Diameter AVP mapping

Cx parameter	AVP Name
...	...
<u>Line Identifier</u>	<u>Line-Identifier</u>

A.4 Message flows

Endorsed with changes.

A.4.1 Registration - user not registered

Endorsed with the following changes:

Figure A.4.1.1 is applicable to IMS-AKA.

Add the following figure:

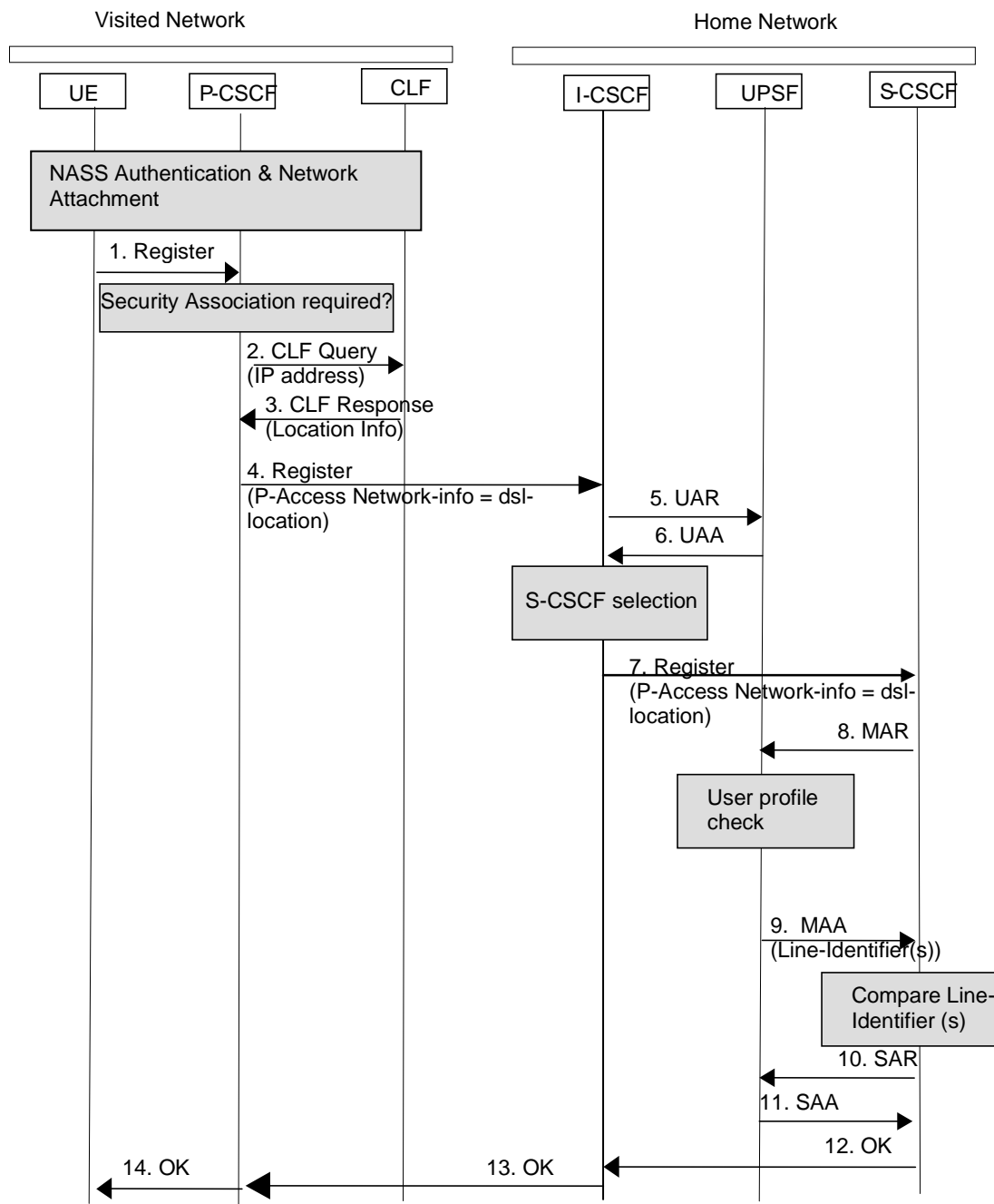


Figure A.4.1.1A: Registration - user not registered (NASS-Bundled authentication)

Annex E (normative)

Endorsed.

Annex F (normative)

Endorsed.

6 Global modifications to 3GPP TS 29.229

Replace the clauses "Scope", "References" and "Definitions, symbols and abbreviations" with the following three clauses (Scope, References, and Definitions, symbols and abbreviations).

1 Scope

The scope is endorsed with the replacement of the "HSS" by the "UPSF".

2 References

Replace the references in [2] as shown in table 2

Table 2: Replacement of references in 3GPP TS 29.229

	Reference in 3GPP TS 29.229	Replaced references
[1]	3GPP TS 29.228 [1] "IP Multimedia (IM) Subsystem Cx and Dx interface; signalling flows and message contents".	The present document (note 1).
[11]	3GPP TS 29.329 "Sh Interface based on the Diameter protocol; protocol details".	ETSI TS 183 037: "Endorsement of the Sh Interface based on the Diameter protocol; Protocol details (Release 6), NGN Release 1" (note 1).
NOTE 1: The reference in [2] is replaced by the document listed on the right column. This replacement is applicable to all occurrences of the reference throughout the present document.		
NOTE 2: The reference in [2] contains 3GPP specific requirements and is not generally applicable to the present document.		

3 Definitions, symbols and abbreviations

Endorsed with changes.

3.1 Definitions

Endorsed with the replacement of the "HSS" by the "UPSF".

3.2 Abbreviations

Replace:

HSS Home Subscriber Server

By:

UPSF User Profile Server Function

Add the following abbreviation:

NASS Network Attachment SubSystem

NOTE: Throughout the present document, all occurrences of "HSS" are replaced by "UPSF".

Throughout the text of 3GPP TS 29.229 [2]

4 General

Endorsed.

5 User of the Diameter Base Protocol

Endorsed with changes.

5.6 Advertising Application Support

Endorsed with the following changes:

The HSS, S-CSCF and I-CSCF shall advertise support of the Diameter Multimedia Application by including the value of the application identifier (see clause 6) in the Auth-Application-Id AVP within the Vendor-Specific-Application-Id grouped AVP of the Capabilities-Exchange-Request and Capabilities-Exchange-Answer commands.

The vendor identifier values of 3GPP (10415) and ETSI (13019) shall be included in the Supported-Vendor-Id AVP of the Capabilities-Exchange-Request and Capabilities-Exchange-Answer commands, and in the Vendor-Id AVP within the Vendor-Specific-Application-Id grouped AVP of the Capabilities-Exchange-Request and Capabilities-Exchange-Answer commands.

NOTE: The Vendor-Id AVP included in Capabilities-Exchange-Request and Capabilities-Exchange-Answer commands that is not included in the Vendor-Specific-Application-Id AVPs as described above shall indicate the manufacturer of the Diameter node as per RFC 3588 [6].

6 Diameter application for Cx interface

Endorsed with changes.

6.1 Command-Code values

Endorsed.

6.2 Result-Code AVP values

Endorsed.

6.3 AVPs

Endorsed with the following changes:

Add the following text at the end of the paragraph before table 6.3.1:

The Line-Identifier AVP has a Vendor-Id header set to ETSI (13019).

Table 6.3.1 is endorsed with the following addition:

Table 6.3.1: Diameter Multimedia Application AVPs

Attribute Name	AVP Code	Section defined	Value Type	AVP Flag rules				May encr.
				Must	May	Should not	Must not	
...
<u>Line-Identifier</u>	<u>500</u>	<u>6.3.34</u>	<u>OctetString</u>	<u>V</u>			<u>M</u>	<u>No</u>
NOTE 1: The AVP header bit denoted as "M" indicates whether support of the AVP is required. The AVP header bit denoted as "V" indicates whether the optional Vendor-ID field is present in the AVP header. For further details, see IETF RFC 3588 [6].								
NOTE 2: Depending on the concrete command.								

6.3.13 SIP-Auth-Data-Item AVP

Endorsed with the following change:

SIP-Auth-Data-Item ::= < AVP Header : 612 10415 >

[SIP-Item-Number]
[SIP-Authentication-Scheme]
[SIP-Authenticate]
[SIP-Authorization]
[SIP-Authentication-Context]
[Confidentiality-Key]
[Integrity-Key]
*[Line-Identifier]
* [AVP]

Add the following clause:

6.3.34 Line-Identifier AVP

The Line-Identifier AVP is of type OctetString. This AVP contains a fixed broadband access line identifier associated to the user.

6.4 Use of namespaces

Endorsed.

7 Special Requirements

7.1 Version Control

Endorsed with changes.

7.1.1 Defining a new feature

Endorsed with the following change:

Table 7.1.1 is endorsed with the following addition:

Table 7.1.1: Features of Feature-List-ID 1 used in Cx

Feature bit	Feature	M/O	Description
...
<u>0</u>	<u>NASS_BUNDLED</u>	<u>O</u>	<p><u>NGN extensions for NASS Bundled authentication.</u></p> <p><u>This feature is applicable for any command pair affected by NGN extensions for NASS Bundled authentication.</u></p> <p><u>When the S-CSCF and the UPSF support this feature, both nodes are able to handle Cx messages with the extensions and/or modifications for NASS Bundled authentication.</u></p>
<u>1</u>	<u>HTTP_DIGEST_MD5</u>	<u>O</u>	<u>NGN extensions for HTTP Digest authentication.</u>
<p>Feature bit: The order number of the bit within the Supported-Features AVP, e.g. '1'.</p> <p>Feature: A short name that can be used to refer to the bit and to the feature, e.g. 'MOM'.</p> <p>M/O: Defines if the implementation of the feature is mandatory ('M') or optional ('O').</p> <p>Description: A clear textual description of the feature.</p> <p>The Supported-Features AVP used to identify features added to this table by the present endorsement document shall contain the vendor ID of ETSI (13019).</p>			

7.2 Supported features

Endorsed.

7.3 Interface versions

Endorsed.

Annex ZA (informative): x additional support for HTTP Digest authentication

This annex provides the additional Cx capabilities needed for supporting HTTP Digest authentication over the Cx interface.

ZA.1 Information elements and signalling flows for HTTP Digest authentication

The authentication procedure is mapped to the commands Multimedia-Auth-Request/Answer in the Diameter application.

Tables 6.3.1 to 6.3.5 of 3GPP TS 29 228 [1] are applicable with the following exceptions:

- Table 6.3.1 is applicable with the clarification that table ZA.1.1 provides a description of the contents of the Authentication Data information element.
- Tables 6.3.2 and 6.3.3 are not applicable.
- Table 6.3.4 is applicable with the clarification that table ZA.1.2 provides a description of the contents of the Authentication Data information element.
- Table 6.3.5 is not applicable.

The following tables are added:

Table ZA.1.1: Authentication Data content - Request

Information element name	Mapping to Diameter AVP	Cat.	Description
Authentication Scheme (See clause 7.9.2 of [1])	SIP-Authenticatio n-Scheme	M	This information element indicates the authentication scheme. It shall contain 'unknown'.
ETSI- Authorization Information (See clause A.2)	ETSI-SIP- Authorization (note)	C	This information element shall be present under the conditions specified in draft-ietf-aaa-diameter-sip-app-10. See clause A.2.
NOTE: An "ETSI-" prefix is added to the ETSI vendor-specific AVP which have an equivalent AVP being defined in draft-ietf-aaa-diameter-sip-app-1.			

Table ZA.1.2: Authentication Data content - Response for HTTP Digest Authentication

Information element name	Mapping to Diameter AVP	Cat.	Description
Authentication Scheme (See clause 7.9.2 of [1])	SIP-Authentication-Scheme	M	This information element indicates the authentication scheme. It shall contain 'HTTP_DIGEST_MD5'.
ETSI Authentication Information (See clause A.2)	ETSI-SIP-Authenticate (note 1)	M	See clause A.2.
ETSI-Authentication Info Information (See clause A.2)	ETSI-SIP-Authentication-Info (note 1)	O	See clause A.2.

NOTE 1: An "ETSI-" prefix is added to the ETSI vendor-specific AVP which have an equivalent AVP being defined in draft-ietf-aaa-diameter-sip-app-10.

NOTE 2: HTTP Digest authentication requires the generation of a nonce in either the UPSF or the S-CSCF. In this version of the specification the UPSF shall generate nonces and the S-CSCF shall not generate nonces, as part of the HTTP Digest authentication process.

ZA.2 Diameter protocol extensions supporting HTTP Digest authentication

The following table describes the Diameter AVPs defined for the Cx interface protocol in support of HTTP Digest, their AVP Code values, types, possible flag values and whether or not the AVP may be encrypted. The Vendor-Id header of all AVPs defined in the present document shall be set to ETSI (13019).

Table ZA.2.1: Diameter Multimedia Application AVPs for HTTP Digest

Attribute Name	AVP Code	Section defined	Value Type	AVP Flag rules				May Encr.
				Must	May	Should not	Must not	
ETSI-SIP-Authenticate	501	-	Grouped	V			M	No
ETSI-SIP-Authorization	502	-	Grouped	V			M	No
ETSI-SIP-Authentication-Info	503	-	Grouped	V			M	No
ETSI-Digest-Realm	504	-	UTF8String	V			M	No
ETSI-Digest-Nonce	505	-	UTF8String	V			M	No
ETSI-Digest-Domain	506	-	UTF8String	V			M	No
ETSI-Digest-Opaque	507	-	UTF8String	V			M	No
ETSI-Digest-Stale	508	-	UTF8String	V			M	No
ETSI-Digest-Algorithm	509	-	UTF8String	V			M	No
ETSI-Digest-QoP	510	-	UTF8String	V			M	No
ETSI-Digest-HA1	511	-	UTF8String	V			M	No
ETSI-Digest-Auth-Param	512	-	UTF8String	V			M	No
ETSI-Digest-Username	513	-	UTF8String	V			M	No
ETSI-Digest-URI	514	-	UTF8String	V			M	No
ETSI-Digest-Response	515	-	UTF8String	V			M	No
ETSI-Digest-CNonce	516	-	UTF8String	V			M	No
ETSI-Digest-Nonce-Count	517	-	UTF8String	V			M	No
ETSI-Digest-Method	518	-	UTF8String	V			M	No
ETSI-Digest-Entity-Body-Hash	519	-	UTF8String	V			M	No
ETSI-Digest-Nextnonce	520	-	UTF8String	V			M	No
ETSI-Digest-Response-Auth	521	-	UTF8String	V			M	No

NOTE 1: The AVP header bit denoted as "M", indicates whether support of the AVP is required. The AVP header bit denoted as "V", indicates whether the optional Vendor-ID field is present in the AVP header. For further details, see IETF RFC 3588 [5].

NOTE 2: Depending on the concrete command.

The SIP-Auth-Data-Item AVP is modified compared to 3GPP TS 29.229 [2] as follows:

The SIP-Auth-Data-Item is of type Grouped, and contains the authentication and/or authorization information for the Diameter client.

AVP format

SIP-Auth-Data-Item ::= < AVP Header : 612 10415 >

[SIP-Item-Number]
 [SIP-Authentication-Scheme]
 [SIP-Authenticate]
 [SIP-Authorization]
 [SIP-Authentication-Context]
 [Confidentiality-Key]
 [Integrity-Key]
 [ETSI-SIP-Authorization]
 [ETSI-SIP-Authenticate]
 [ETSI-SIP-Authentication-Info]
 *[AVP]

Add the following AVP syntax:

The ETSI-SIP-Authenticate is of type Grouped, and contains a reconstruction of either the SIP WWW-Authenticate or Proxy-Authentication header fields specified in RFC 2617 [4]. Additionally, the AVP may include a Digest-HA1 AVP that contains H(A1) (as defined in RFC 2617 [4]).

AVP format

ETSI-SIP-Authenticate ::= < AVP Header : 501 13019 >

{ ETSI-Digest-Realm }
 { ETSI-Digest-Nonce }
 [ETSI-Digest-Domain]
 [ETSI-Digest-Opaque]
 [ETSI-Digest-Stale]
 [ETSI-Digest-Algorithm]
 [ETSI-Digest-QoP]
 [ETSI-Digest-HA1]
 *[ETSI-Digest-Auth-Param]
 *[AVP]

The ETSI-SIP-Authorization is of type Grouped, and contains a reconstruction of either the SIP Authorization or Proxy-Authorization header fields specified in RFC 2617 [4].

AVP format

ETSI-SIP-Authorization ::= < AVP Header : 502 13019 >

```

    { ETSI-Digest-Username }
    { ETSI-Digest-Realm }
    { ETSI-Digest-Nonce }
    { ETSI-Digest-URI }
    { ETSI-Digest-Response }
    [ ETSI-Digest-Algorithm ]
    [ ETSI-Digest-CNonce ]
    [ ETSI-Digest-Opaque ]
    [ ETSI-Digest-QoP ]
    [ ETSI-Digest-Nonce-Count ]
    [ ETSI-Digest-Method ]
    [ ETSI-Digest-Entity-Body-Hash ]
    *[ ETSI-Digest-Auth-Param ]
    * [AVP]

```

The ETSI-SIP-Authentication-Info AVP is of type Grouped and contains a reconstruction of the SIP Authentication-Info header specified in RFC 2617 [4].

AVP format

ETSI-SIP-Authentication-Info ::= < AVP Header: 503 13019 >

```

    { ETSI-Digest-Nextnonce }
    [ ETSI-Digest-QoP ]
    [ ETSI-Digest-Response-Auth ]
    [ ETSI-Digest-CNonce ]
    [ ETSI-Digest-Nonce-Count ]
    *[ AVP ]

```

ZA.3 Additional Cx feature in support of HTTP Digest authentication

This feature is applicable for any command pair affected by NGN extensions for HTTP Digest authentication.

When the S-CSCF and the UPSF support this feature, both nodes are able to handle Cx messages with the extensions and/or modifications for HTTP Digest authentication.

See table 7.1.1 in the present endorsement of 3GPP TS 29.229 [2].

History

Document history		
V1.1.1	April 2006	Publication
V1.1.3	April 2007	Publication
V1.2.0	October 2007	Publication